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EXHIBIT "A"

Dominick V. Rosato

Rosato's Plastics Encyclopedia and Dictionary

Hanser Publishers, Munich Vienna New York Barcelona

The Author: Dominick V. Rosato, 40 Karen Road, Waban, MA 02168, USA

Die Deutsche Bibliothek – CIP-Einheitsaufnahme

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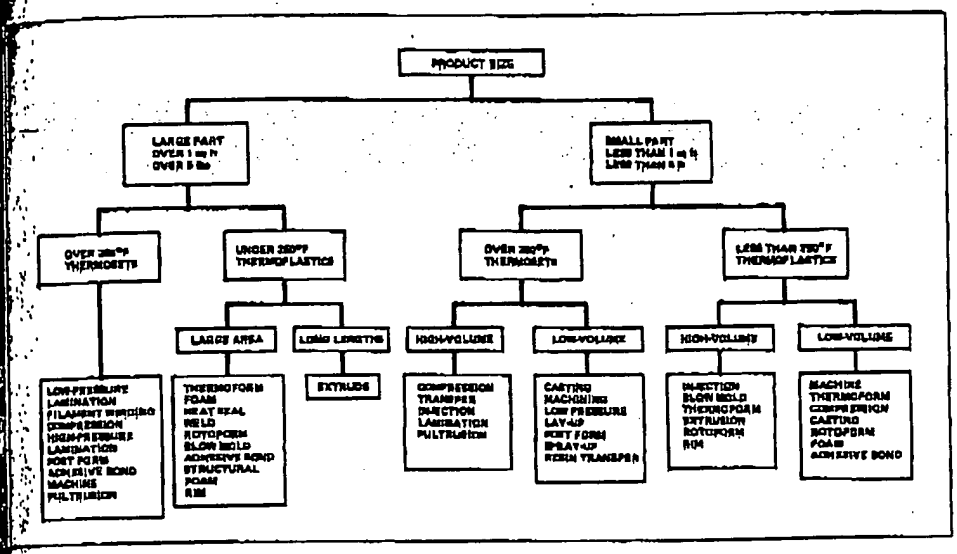


Guide to product size.

materials. At room temperature it will stretch under tension and will return quickly and forcibly to its original dimensions and shape when tension is removed. It may be manufactured by weaving, braiding, knitting, etc.

fabric fill face That side of a woven fabric on which the greatest number of yarns are perpendicular to the selvage.

fabric, flash-spun ▷ **flash-spun nonwoven fabric**

fabric, fluted core ▷ **fluted core**

fabric gout Foreign matter, usually lint or waste, woven in a fabric by accident.

fabric, greige ▷ **greige goods**

fabric, hand The softness of a piece of fabric, as determined by the touch (individual judgement).

fabric handling characteristics ▷ **glass fabric RP weave pattern**

fabric impregnated A fabric in which the interstices between the yarns are completely filled with the impregnating compound throughout the thickness of the material, as distinguished from sized or coated materials, where these interstices are not completely filled.

fabric, melt-blown ▷ **melt-blown nonwoven fabric**

fabric nebs Little lumps of tangled fibers or small thickened places, found in fabric or yarn.

fabric nested ▷ **reinforced plastic nesting**

fabric nonwoven Fibrous sheets made without the conventional spinning, weaving, or knitting. They include "mechanical" bonded fabrics, "flashspun" fabrics, "melt-blown" fabrics, and "spun-bonded" fabrics. The interlocking of fibers is achieved by mechanical work, chemical action, moisture, solvents, nonconventional spinning, and/or heat. They may consist of one or more types of fibers.

fabric prepreg batch Prepreg containing fabric from one fabric batch and impregnated with one batch of plastic in one continuous operation. ▷ **prepreg**

fabric, spun-bonded ▷ **spun-bonded nonwoven fabric**

fabric, three-dimensional ▷ **three-dimensional fabric**

fabric, twill weave This fabric interlaces ne or more warp yarns over and under two r more filling yarns in a regular pattern. This produces either a straight or a broken diagonal line in the fabric, which, consequently, has greater pliability and better drapability than both plain weave and basket weave.

fabric warp face That side of a woven fabric on which the greatest number of yarns are parallel to the selvage.

fabric woven A material mechanically constructed of interlaced yarns, fibers, or filaments; usually a planar structure. Randomly integrated

lamella A thin, flat scale or part. ▷**antifoaming agent** and **Raman spectroscopy**

lamellae Plural of lamella.

lamellar thickness A characteristic morphological parameter, usually estimated from X-ray studies or electron microscopy, that is usually 100 to 500 A (10 to 50 mm). The average thickness of lamellae in a specimen.

lamina A single ply or layer in a laminate, which is made up of a series of layers.

laminae Plural of lamina.

laminar flow 1. The movement of one layer of fluid past or over anotherlayer without the transfer of matter from one to the other; the fluid is in layers or laminae which is maintained as the flow progresses. ▷**Reynold's number** and **turbulent flow.** 2. Flow of thermoplastic melt in a mold cavity that is accompanied by solidification of the layer in contact with the cooler mold surface that acts as an insulating "tube" through the cavity; in turn melt continues to flow filling the remainder of the cavity. This type of flow is essential to duplication of the mold surface. ▷**flow model** and **Reynold's number.** 3. Thermodynamically, flow in which the head loss is proportional to the first power of the velocity.

laminate A product made by bonding together two or more layers of material or materials. The types of materials used in a laminate can be endless. Included are: plastic film, sheet, and tape; foils of aluminum, steel, paper, etc.; different types of woven and nonwoven fabrics using synthetic and natural fibers; etc. In the reinforced plastics industry, laminates refer mainly to superimposed layers of plastic impregnated or plastic coated fabrics, or fibrous reinforcements which have been bonded together.

Laminate can have directional lay ups to orient individual layers to meet different performance requirements; materials include oriented film, reinforced plastics, etc. ▷**orientation** and **reinforced plastic, directional properties.** Methods of processing laminates include coextrusion, coinjection, pressure sensitive adhesive, compression molding, press laminating, etc. Solidification or curing of laminates depends on plastic used; they can be from room temperature with no pressure, through contact or low pressure, to high temperature and high pressure. ▷**molding pressure, high** and **molding pressure, low**

laminated molding A molded plastic product fabricated by bonding together, under heat and pressure in a mold, layers of materials. Also called laminated pressing.

laminated nested A reinforced plastic laminate in which the plies are placed so that the yarns of one ply lie in the valleys between the yarns in the adjacent ply.

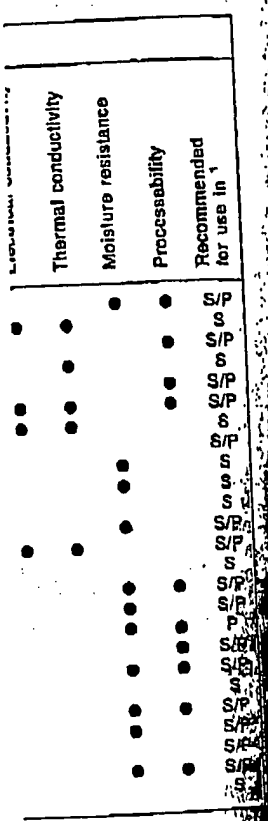
laminated plastic 1. A class of standard structural shapes, plates, sheets, angles, channels, rods, tubes, etc. that are made from reinforced plastics. 2. ▷**laminate** since all types of laminated materials can be used as just reviewed.

laminated pulled surface In laminated plastics, imperfections in the surface, ranging from a slight breaking or lifting in localized areas to pronounced separation of the surface from the body.

laminate, high pressure molding ▷**molding pressure, high**

laminate, high pressure press As shown in the Fig. below, multiple opening platen press is an example of equipment used since the 1920s to mass produce flat laminates (decorative

High pressure laminating press.



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plastics and packaging industries by their thickness. A web under 10 mils (0.0254 cm) thick is usually called film, however under 4 mils (0.01 cm) is also used. Material over these dimensions are called sheets. The 4 mil value tends to be more applicable to the manufacture of plastic films.

Films are primarily used for packaging with compositions designed for specific end uses. They can be made permeable or impermeable to moisture and other gases, heat sealable, heat shrinkable, heat formable (vacuum), heat resistant, insoluble or soluble, transparent, opaque to uv light, weatherable, flammable, fire resistant, conductive or nonconductive to electricity, printable, postformable after lamination, and also available in a wide range of colors, etc. To further enhance their performance, films can be coated, sprayed, etc. ▷ **skiving**

film adhesive ▷ **adhesive film**

film aluminum ▷ **aluminum foil**

film and tape Films are shaped plastics that are comparatively thin in relation to their length and width. Tape is the term used for relatively narrow films, such as from 1/16 to 1 in (0.025 to 1.6 cm) in width.

film bead ▷ **extruder film quench-tank**

film blocking An adhesion between touching layers of plastic, such as that which may develop under pressure during storage or use. The tendency of blocking depends upon temperature, moisture, humidity, physical properties of the plastic itself and processing conditions. If the plastic has a low softening point or if it picks up moisture readily, it will have a greater tendency to block than a plastic which has a high softening point and does not pick up moisture. The physical properties of the plastic itself upon which blocking depends are as follows: (1) rough surfaces adhere more readily than smooth, (2) adhesion will depend on the amorphous or crystalline character of the plastic with amorphous having a greater tendency to block, (3) if one surface is readily wet by the other, the tendency to block is increased, (4) if the melting point is low, there will be an increased tendency to block, (5) if a surface shows flow under pressure the tendency to block may be severe, (6) blocking is promoted by the tendency of the plastic to pick up water vapor, and (7) film and sheet develop static electricity readily adhere to each other.

The ability to slide one film layer is usually a result of poor slip or a high coefficient of friction such as with polyethylene film. It may be caused by the attraction of two very smooth, glossy film surfaces to one another. Blocking is a function of some inherent plastic property in addition to processing conditions. There is a relationship between slipping and antiblocking properties, though good slip does not necessarily correlate with resistance of a film to blocking. Additives are also used to overcome both poor slip and blocking. Use of too much tension at the windup by the film extruder greatly increases blocking tendencies. This can be further aggravated by insufficient cooling of the film so that the film is still warm, particularly at fast speeds. Thus, blocking may be substantially reduced by low tension windup, slower windup rates, increasing the distance between the die and nip rolls, using a minimum nip roll pressure in blown film extrusion, and extruding hot flat film into a comparatively cool water bath in flat film extrusion.

Surface blocking is more of a problem in blown film than in flat film extrusion. The inflated bubble travels at high speed and, cooled only with air, is squeezed together and wound only a few seconds from leaving the hot die lands. Blocking may occur on the inside of the tube, on its outside, or in extreme cases, both inside and outside. Thicker films are easier to separate than thinner ones because of a better transmission of the shear forces applied (during bag opening). Generally, lower melt index PE requires less antiblocking additive than higher melt index plastics. The influence of higher density is even more beneficial. An excess of film surface treatment used for good printing ink adhesion frequently causes blocking. Such treatment alters the surface chemically (which is essential for ink adhesion) and warms the film. The treatment drives off slip agents from the surface treated side and thus, enhances blocking. To reduce these adverse influences (including the above processing comments), overtreatment must be avoided. ▷ **antiblocking agent; antistatic agent; antislip agent; lubricant; dusting agent; slip additive**

film blowing ▷ **extruder, blown film** and **thermoforming, clam shell**

film brittleness ▷ **extruder film brittleness**

film casting 1. The process of making unsupported film or sheet by casting a fluid plastic compound on a temporary carrier, usually an endless belt or roll (drum), followed by solidification and removal of the film from the carrier. Liquid plastic on a substrate is stabilized by evaporation of solvent, by fusing after deposition, or by allowing a melt to cool. Cast films are usually made from solutions or dispersions. **2.** The term film casting has been used also for

filler specks

Examples of fillers and reinforcements.

Filler or Reinforcement	Properties Improved													Recommended for use In [1]
	Chemical resistance	Heat resistance	Electrical insulation	Impact strength	Tensile strength	Dimensional stability	Stiffness	Hardness	Lubricity	Electrical conductivity	Thermal conductivity	Moisture resistance	Processability	
Alumina, tabular	●	●	●	●		●	●			●	●		●	S/P
Aluminum powder														S
Aramid	●	●	●	●	●	●	●	●	●	●	●		●	S/P
Bronze							●							S
Calcium carbonate	●	●	●	●		●	●	●		●	●		●	S/P
Carbon black		●				●	●			●	●			S/P
Carbon fiber				●		●	●	●				●		S
Cellulose			●			●						●		S
Alpha cellulose														S
Coal, powdered	●		●	●	●	●	●	●				●		S/P
Cotton	●	●	●	●	●	●	●	●		●	●			S/P
Fibrous glass	●				●	●	●	●	●					S
Graphite				●			●						●	S/P
Jute	●	●	●			●	●	●	●	●		●		S/P
Kaolin	●	●	●			●	●	●	●	●		●	●	P
Mica							●	●						S/P
Molybdenum disulfide	●	●	●	●	●	●	●	●				●	●	S/P
Nylon	●	●	●	●	●	●	●	●						S
Orlon			●	●	●	●	●	●				●	●	S/P
Rayon			●									●		S/P
Silica, amorphous				●		●	●	●						S/P
Sisal fibers	●					●	●	●		●				S/P
Fluorocarbon						●	●	●		●			●	S/P
Talc	●	●	●			●								S
Wood flour			●			●								

[1] P = thermoplastic, S = thermoset.

or to improve physical properties, particularly hardness, stiffness, and impact strength (see Table above). A filler differs from a reinforcement in that it is small and it does not markedly improve the tensile strength. The most commonly used general purpose fillers are clays, silicates, talcs, carbonates, and wood flour. Some fillers also act as pigments (carbon black, chalk, and titanium dioxide). Graphite, molybdenum disulfide, and PTFE are used as fillers to impart lubricity. Magnetic properties can be obtained by using magnetic mineral fillers such as barium sulfate. Other metallic fillers such as lead or its oxides are used to increase specific gravity; powdered aluminum imparts higher thermal and electrical conductivity, as do other powdered metals such as copper, lead, and bronze. Graphite powder can be used to cause the plastic to shrink when heated: rather than the expected expansion. ▷ **additive** and **reinforcement**

filler specks Visible specks of a filler used, such as wood flour, which stand out in color contrast against a background of a plastic binder.

fillet 1. A rounded filling of the internal angle between two surfaces specified by a radius. 2. A rounded filling (plastic or adhesive) that fills the corner or angle where two adherends are joined.

filling yarn ▷ **yarn, filling**

fill point The level to which a container must be filled to furnish a designated quantity of the contents.

fill-sanding plastic A general purpose polyester (TS) used to soak and fill reinforcing material in the initial lay-up of a surfacing application; usually contains wax.

film Films are formed by melt extrusion using flat or circular dies, by calendering, by solvent casting, by chemical conversion, or by skiving. The resulting films may be uniaxially or biaxially oriented or rolled to modify their properties. Films are distinguished from sheets in the